

BIRTH THROUGH THREE: THE CRITICAL YEARS

The Case For Early Intervention

1984

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FOREWORD

Minnesota's landmark special education law, passed in 1957, made the public schools responsible for educating handicapped children with IQs over 50, and permitted them to educate children with IQs under 50. In response to parental concerns that trainable mentally retarded children were not being served by their school districts, the State Legislature passed a pilot day activity center bill in 1961 which allowed ten pilot DACs to be established with state funds appropriated by the Legislature, matched at the local level by private donations. The success of the pilot effort led to the passage in 1963 of a grant-in-aid bill which allowed public and private agencies to receive matching funds to operate day programs for retarded children and adults who "by reason of age or disability" were not eligible for public school programs.

Twenty-one years later, the programs, now called "developmental achievement centers," are supported, not by state grants-in-aid, but by a combination of federal Title XX dollars, county levies and parent fees.

In 1967, the State Legislature amended the special education statutes to allow districts to collect the same special education aids for programs for handicapped children under school age as they collected for school-age programs. This permissive legislation was passed in response to two serious maternal rubella epidemics which swept through Minnesota in the middle 1960s, leaving in their wake a large population of deaf infants. Educational research had already demonstrated that the serious academic retardation of deaf children could be substantially ameliorated by helping them to develop language during the first three years of life, the normal language learning years for all children. As research and experience underscored the value of early intervention, some school districts began to serve children with other handicapping conditions.

When the education of trainable children was mandated by the Legislature in 1971, mentally retarded children of school age (5 to 21) moved from DACs into public school programs, leaving a number of four-year-olds to continue in DACs. When the law subsequently changed to make four the age of school entering for all handicapped children, a few DAC programs were taken over by school districts and others began enrolling retarded children under the age of four and later added some children with cerebral palsy, including infants.

In the intervening years, some school districts have established their own programs for handicapped children under age four, others have contracted for services for their retarded children with DACs, and others have chosen not to offer services to any handicapped children under school age. The 1983 child count of handicapped children in Minnesota shows that 220 school districts enrolled 1,125 handicapped children under age 4 and 47 DACs enrolled 1,396 mentally retarded children, some of whom also had cerebral palsy.

The benefits of early intervention, supported by widely publicized research, are many. There are exemplary programs in Minnesota, operated by both school districts and DACs, which equal or surpass the programs described in the literature of early intervention. The problem is that they are not accessible to children who live outside their service areas. Another concern is that, with dwindling resources, many DACs have had to charge parent fees which have made it impossible for some children and their parents to participate. In some districts there are neither school programs nor DACs and in many areas of the state, there are no programs for children under school age with hearing, vision and physical impairments. The current programs serve only a third of the eligible children. This inequity can be corrected by using existing and potential resources in a mandated coordinated system of early intervention.

BIRTH THROUGH THREE: THE CRITICAL YEARS

I. WHY EARLY INTERVENTION

All education is based on our understanding that human behavior is a dynamic process of complex interactions between individuals and their environment. In the education of handicapped children, interventions are most effective if they are undertaken very early before inappropriate behaviors are learned. A handicap does not stand alone but influences other aspects of the child's behavior and general development as well. Without proper management of the early environment, socially inappropriate behaviors may develop. Handicapped infants and their parents are unable to engage in the nurturing interplay that nonhandicapped infants and their parents enjoy. Intervention in the birth through age three period can help to reduce the physical, social and psychological consequences of handicapping conditions.

Developmental and educational psychologists have, through years of research and the testing of models, developed a rationale for early intervention services for handicapped children based on four premises:

- 1) human behavior at any point represents a series of elaborations of previous levels of behavior, from simple to complex, beginning at birth,
- 2) the acquisition of motor, cognitive and language skills is interrelated,
- 3) social behaviors are learned in infancy, and
- 4) failure to learn also begins at birth.

From Simple to Complex

From birth on, acquiring cognitive and social skills is dependent on a two-way give-and-take between the child and the environment. A handicapped child's diminished ability to act on his environment will have a cumulative effect on his growth and development. The opportunity to alter these basic interactions and skills is lost if intervention is delayed until age four.

Development is Interrelated

Because motor skills, cognition and language interact in the developing individual, deficits in one area will significantly influence other areas. Without intervention, the child with cerebral palsy will develop inappropriate motor patterns which will impair his ability to care for himself, the blind child will develop self-stimulating behaviors which interfere with social interaction, the deaf child will fail to acquire the inner language he needs to learn to read, the retarded child, living with inadequacy and frustration, will lose the motivation to learn.

Social Behaviors are learned Early

Handicapped and retarded persons are segregated from normal life in the community and in school, not because of their learning problems, but because of behaviors which are either socially unacceptable, inappropriate, aggressive, and/or self-destructive. These behaviors are not the result of the handicap, but, rather, have developed in the absence of proper management of the child and his environment during the early years.

Failure to Learn Begins at Birth

It is now recognized that infants are learning from the moment of birth and that, contrary to earlier theories, it is the child's behaviors that shape the behavior of the parents. The establishment of interaction patterns between the infant and his parents sets the stage for communication, learning and social behaviors. Lacking the normal cues of infant behavior, parents are not able to interact with their handicapped child in ways that will assure optimal growth.

Very Early Intervention and Parent-Child Relationships

There is a small but growing body of research that shows that intervention in the very early years can reduce or prevent the negative consequences of the child's handicap on the parent-child relationship. This intervention focuses

on the relationship between infant and parents and the establishment of structured learning experiences through age three.

SUMMARY

WHY VERY EARLY INTERVENTION

- Adverse early learning has long-term cumulative effects.
- Development proceeds from simple to more complex behaviors.
- Deficits in one area of development affect other areas.
- Social behaviors are learned early.
- Patterns for learning are based on the reciprocal interactions of infant and parent.
- Very early intervention focuses on the initial interactions of parents and infants and the structure of learning opportunities from birth through age three.

II. LEARNING IN INFANCY

Research has demonstrated that even interventions with newborn infants can have a positive effect on growth and responsiveness. From the moment of birth, infants actively engage in learning. Learning is a cumulative process in which later learning is built upon the simple forms of learning established in early infancy. The very early patterns of interaction between parent and child correlate with the child's emotional-social development. The inability of a handicapped infant to give cues to his parents or to respond to parental attempts to engage his attention leave parents feeling frustrated and incompetent. These unsatisfactory interaction patterns can be identified and modified with long-term positive effects for both parents and child.

Focus on Enriched Experiences

During the 1930s and 1940s, research into the origins of human development established the importance of a child's early environment in accelerating or retarding both physical and mental growth. The long-standing conviction that genetic predisposition determined intelligence has been replaced by an awareness of early environment as an important influence on the child's developing intelligence. During the decade of the 1950s, there was an increasing realization that the limited early life experiences of some poor and minority children had more to do with their school performance than genetic endowment. The Head Start experiment showed that intervention, to have lasting effect, must start earlier than a single year before children enter school and must focus on both parents and children.

Interdependent and Independent Living

It has been widely accepted that an individual's most rapid development occurs during the first three years of life. The areas of motor, emotional, social and language development are interdependent - development in one area affects development in another. For example, once a child can crawl, there is much greater opportunity for the exploration necessary for the child to understand his world. Development in one area, however, does not predict development in another.

Acquisition of Learning

During the sensory motor state of development, children learn through their senses by experience. The child can recognize, remember, store new information, compare new knowledge with existing knowledge, plan actions, and understand his relationship to the objects and people of his world. These critical learning experiences are acquired largely through trial and error. For the handicapped infant, it is critical that the child's early learning experiences be matched to his capabilities, not only to facilitate learning, but to build self-esteem and autonomy.

The Infant As An Active Learner

In the late 1960s, research into parental stimulation of young infants showed that parents do not simply act upon their infants but, rather, that the relationship is reciprocal. It was found that infants initiate at least half of all parent-child interactions and that the infant modifies the parents' behavior by responding selectively to the parents. These findings radically changed the perception of infants from helpless creatures to active manipulators, participating actively in their own learning.

Effects of Stimulation on Infant Development

In the next few years, a number of infant stimulation experiments were carried out with premature infants and their parents, with the intervention beginning immediately after birth and continuing until the children were released from the hospital. Methods were developed to involve the infants' senses of touch, hearing, and movement and to measure physiological outcomes such as weight gain, maturational level, visual attentiveness, sleep and wakefulness, and neurological development. Collectively, these studies provided solid evidence that the physical growth and social responsiveness of premature infants can be facilitated by supplemental stimulation during the early weeks and months of life (Masi, 1975).

Two exemplary studies (Field, 1981, Scarr-Salapatek, 1973) followed their subjects into the toddler years to examine the long-term effects of neonatal stimulation. They reported significant improvement in IQ scores between ages one and two. Both studies involved the infants' parents, either by giving them specific guidance on activities to stimulate their children's development, or by focusing parents' attention on the child's individual responses to stimulation.

Focus on Parent-Infant Interaction

Expectancy plays an important part in the reactions of both infants and parents to the interaction between them. When one partner in a transaction does not respond as expected, the interaction is halting and mutually unsatisfying. When parents and infants are out of phase with each other, their relationship becomes negative and frustrating. Research studies have identified parent-infant interaction as critical to the development of infant social-emotional skills and communication and learning abilities.

Effect of Parents

Disturbed and unsatisfying interaction patterns were also found to have a lasting negative influence on the parents' feelings of effectiveness and competence. The mother's ability to soothe her infant and to hold the child's smiling attention are the source of great satisfaction. Parents' frustration or satisfaction with their early attempts at caregiving and interaction influence their continuing relationship with the child, for better or worse.

SUMMARY LEARNING IN

INFANCY

- The systems by which a child acquires later learning are established before the age of three.
- The growth and responsiveness of newborn infants can be positively affected by supplemental stimulation.
- The infant is an active participant in his own learning.
- The infant-parent relationship is a reciprocal one, with each acting upon the other.
- Interaction patterns are established very early in the child's life and tend to persist.
- Interaction patterns can be either harmonious or disturbed.
- Parents must learn to interpret and respond to their infant's cues so that their behaviors are matched to the child's needs and readiness.
- Harmonious, reinforcing interactions are critical elements in the process of parent-child attachment and in the development of attention, memory and communication skills.

III. EFFECT OF HANDICAPPING CONDITIONS ON INFANTS

Each handicap and each combination of handicaps present severe obstacles to early learning. Handicapped infants have temperament patterns which make them both harder to soothe and harder to stimulate. Their parents are unlikely to enjoy the feelings of competence and satisfaction that parents of normal infants enjoy. Many infants and toddlers are unable to give their parents cues that indicate their physical, emotional and developmental needs. Lacking these cues, parents are far more likely to find it difficult or even impossible to develop concordance between the baby's needs and their behavior, a kind of harmony that occurs naturally with nonhandicapped infants. Parents need expert help in shaping their behavior toward their child as well as the child's learning experiences in order to assure optimum development.

Congenitally handicapped children have unique characteristics to which parents must be helped to adapt if they are to achieve a harmonious relationship with their child. Children with physical or sensory handicaps often lack the reflexes needed for a clear response. Unable to elicit the expected response, parents do not experience warm feelings of satisfaction and competence and are unable to achieve the harmonious interaction so necessary to their child's continuing development. When infants have diminished ability to indicate their readiness to respond or to reinforce appropriate parental behaviors, their parents need help in identifying the child's cues and responding confidently.

Deaf and Hearing Impaired Infants

Because speech and language develop during the birth through three age span, some of the strongest longitudinal evidence in support of very early intervention has been generated by work with severely hearing impaired infants and their parents. Without the assistance of an alternative communication system, parents are unable to interact with their deaf children and are helpless to find ways to communicate. For the hearing impaired child, the inner language so essential to the learning of concepts and the ability to think must be developed in the first three years of life. Delaying beyond that point seriously

jeopardizes the child's school achievement, his relationships with his parents and peers, and his ability to function as a self-sufficient adult. The inadequate stimulation that results from delaying educational procedures and amplification of voices and other sounds in the child's environment may produce an overwhelming learning handicap which can never be overcome.

Sandy, A Case Study

Mrs. J. suspected that her infant daughter did not have normal hearing because she did not respond to her parents' voices, or react to loud sounds. Although the family physician continued to discount the parents' observations, they insisted that Sandy be seen by an otologist. Auditory testing revealed a pronounced hearing loss. The audiologist referred the family to the Como Special Program for hearing impaired infants. Equipped with hearing aids, Sandy was enrolled in the infant program. She and her mother attended two half-day sessions each week where auditory training, fingerspelling, speech reading, signing, and speech and language training prepared Sandy for dealing with her world. At age two, Sandy moved into Como's half-day preschool program.

Now five years old, Sandy has speech at near the normal level for her age. Because she has some hearing, her parents and the school staff have been able to exploit that residual hearing to the maximum. Her mother says, "If Sandy had not had the program as an infant, we would not have known how to work with her, and those early months would have been lost. She would have been a much more handicapped child than she is. With her hearing aids and the speech and auditory training she's had, she will be able to be in a mainstream class with children who have normal hearing."

Physically Handicapped Infants

For the parent of a normal infant, feeding, bathing and routine handling of the child give pleasure and satisfaction. These same routines are difficult and time consuming for the parent of a physically handicapped child, leaving the parent feeling anxious, incompetent, and exhausted. Parents need expert assistance in order for these activities to become occasions of learning and pleasure for both parent and child. Physical impairments may interfere with such basic life activities as swallowing, chewing, speech, balance, head control, reach and grasp, and locomotion. These skills must be carefully taught and extensively practiced.

Mark, A Case Study

Mark, now 3 ½, has been going to school since he was three months old. His cerebral palsy was diagnosed at that time and his doctor, a pediatric neurologist at St. Paul Children's Hospital, referred his parents to the Como Special Program for physically impaired infants. Both parents have been deeply involved in Mark's program, learning not only how to exercise and position him, but also how to minimize his disabilities and increase his independence. Mark has learned to sit up, a difficult position for a child with cerebral palsy to achieve. From this position, he is able to look at materials placed in front of him, and to use his hands to grasp objects. He can handle a cup, finger foods and toys.

Mark's father: "Nobody is ever prepared to be the parent of a handicapped baby. Without the help the early education staff has given us, we would not have known how to help Mark. They not only showed us what to do, they gave us the confidence we needed to carry out his program. We're convinced that, without this early intervention, Mark would still be lying on his back, as stiff as a board."

Mark's parents, through the early education program, have also enjoyed the friendship and support of other parents, sharing tips and triumphs, and helping each other over the inevitable setbacks and disappointments.

Blind and Visually Handicapped Infants

Much social interaction and, certainly, parent-child interaction is based on eye contact. This critical avenue of communication is denied the blind child and his parents. Here again, parents feel helpless in dealing with the child's handicap without skilled assistance very early in the child's life. This disorder severely limits the blind child's mastery of his environment. Intervention of a tactile and auditory nature is necessary to provide experiences which enhance the development of mobility, autonomy and critical problem solving. The blind infant is locked in a world only half as stimulating as that of the normal infant and often develops self-stimulating behavior which serves as a substitute for interaction with the world of objects.

Kevin, A Case Study

Kevin is now a well integrated, successful sixth-grader. He is eleven years old and attends a suburban elementary school near his home. Kevin is also blind as a result of a condition related to his extreme prematurity called retrolental fibroplasia. His blindness was diagnosed early - at four months.

State Services for the Blind referred the family to a regional program for visually handicapped infants operated by the Saint Paul Public Schools when he was six months old. Both parents entered enthusiastically into Kevin's program, gaining confidence from their association with other parents as well as the teachers and therapists in the early education program.

In reminiscing about those infant experiences, Kevin's mother said, "The news of Kevin's blindness was devastating. Without the support and training we got from the school, we would not have had the slightest idea of what to do. We needed those other parents, too. We needed to know that our child had the potential to become the competent person he is."

In assessing the contributions of Kevin's early education program, his mother ticked off the advantages her child had when he entered first grade, "He entered school with good academic skills. He had excellent mobility and self-help skills and the social competence to get along well with his peers." Both parents agree that without the early intervention services that they and their son had, Kevin would have been a more dependent child, even to the extent of needing a specialized program for blind children.

Mentally Retarded Infants

For the child with intellectual impairments, it is essential that easily accessible learning opportunities, with a clear, unambiguous focus, be made available as early as possible. These early experiences should encourage the optimal development of the child's ability to attend, perceive, and remember. The retarded child needs to be exposed to activities that match his ability so that he will not lose the motivation to master skills. Parents need to learn how to provide the level of experiences that will enhance learning and avoid the frustration of constant failure.

Molly, A Case Study

Molly has Down's Syndrome. At two weeks of age she was enrolled in a DAC home-based infant stimulation program (St. Paul's on the Hill DAC). During the weekly visits of the early intervention specialist, Molly's mother learned a host of activities aimed at overcoming her child's fine and gross motor deficiencies and preventing some of the gait and motor problems associated with Down's Syndrome. At 18 months, Molly began attending a half-day preschool program designed to prepare her to enter school at age four. Now six years of age, Molly is making her way in a normal first grade, with only a little help. She is learning reading and math skills, once thought impossible for a child with her handicap.

Molly's mother says, "I know that my child's remarkable progress can be attributed to a great extent to the fact that intervention was started so early. I was taught something new every week, things I would never have thought of, that helped to improve Molly's speech and motor skills. When I see the difference between Molly and children in her school who didn't have infant and preschool training, I realize how much more their specialized education is going to cost than my child's mainstream program. I believe that early intervention saves tax dollars and that those savings start the day the child enters school."

SUMMARY

EFFECT OF HANDICAPPING CONDITIONS ON INFANTS

- Parents of handicapped infants need expert assistance in order to develop harmonious interactions with their children, to understand the cues they give, and to provide learning environments and training activities to stimulate optimal development.
- Each handicap and combination of handicaps present a particular set of obstacles to efficient learning.
- Handicapped infants benefit less from experiences which are the foundation for intellectual, language, socialization and motor skills in normal children.
- Feelings of competency which motivate children to learn are at grave risk in handicapped infants.

IV. THE LANGUAGE ENVIRONMENT OF THE HANDICAPPED INFANT

Parents of handicapped infants may unwittingly aggravate their child's problems by being overly vocal and overly directing, and by failing to reinforce the child's attempts to make sounds. Our knowledge of factors which affect the infant's language and cognitive development make it imperative that we use this knowledge to intervene as early and as positively as possible in the life of the handicapped child.

Language has long been identified as the best predictor of school success. In the last decade, research has turned to an examination of the origins of language, with particular focus on the first year of life. While there are theoretical differences as to the origin of language, there is general consensus that infants are engaged in learning language well before they speak their first words.

A significant part of language learning occurring during the first year of life relates to the establishment of the system of reciprocal parent-child communication. The role of initiating and responding behaviors in the interaction between infant and parent are important factors in the later acquisition of expressive language. Since many children with handicaps also have language disorders, these findings indicate the critical need to teach parents to respond to and reinforce their handicapped infants' attempts at communication.

Field (1981) has confirmed a positive relationship between the amount of maternal talking and the infant's failure to make eye contact. If the partner in a conversation looks away, you conclude that you are not "getting through." This happens frequently in the interaction between handicapped infants and their mothers. It is a strong indicator that the parent is not providing stimulation at the infant's level, and not understanding what is going wrong.

Several researches have found significant differences in the amount and kind of language used by mothers of handicapped children. Parents tend to use directing/controlling language designed to limit, guide or direct the

infant's behavior instead of eliciting a response. This kind of parental language has long been associated with a slower rate of language acquisition in children.

Implications for Intervention

Because the parents' teaching role is critically important, it is essential that they be taught how to stimulate and reinforce their handicapped infants' language learning.

SUMMARY

THE LANGUAGE ENVIRONMENT OF THE HANDICAPPED INFANT

- Parents get less satisfaction from their handicapped infants because the children smile less, cry more and are more difficult to handle than normal infants.
- Many handicapped infants have difficult temperaments which make them unsatisfying to care for.
- These disturbed patterns of interaction between parent and child are linked to delays in attachment, cognitive development and linguistic competence.
- The language parents use with handicapped infants does not take into account the infant's slower readiness to respond. Parents need to learn how to recognize the infant's optimal time for interaction.

V. METHODS OF INTERVENTION

A variety of education and therapeutic early intervention programs, both center-based and home-based, have helped parents to interact in a positive, loving way with their handicapped infants and toddlers. Showing parents how to alter their language patterns to encourage initiating as well as responding behavior can accelerate the developmental rate of even severely handicapped young children. To be effective, intervention must be early, continuous, intense, and specific.

A review of the research literature on early intervention yields persuasive evidence of the value of programs which begin at birth, or soon thereafter, and which feature both parent education and training of the handicapped infant. Infants with every kind and combination of handicapping conditions showed improvement in functioning and were easier and more satisfying for their parents to care for. Parents were taught how to stimulate and encourage their children's development. These gains were noticed in a variety of program settings, whether services were given at home, in a school or center, or in a combination of both.

Infants with Down's Syndrome

A University of Oregon program for infants with Down's Syndrome featured weekly home visits during which parents were given detailed educational programs for their babies. They were also taught how to record their children's progress. Instead of a control group, project staff used two sets of developmental milestones against which to measure the progress of their small subjects: those of Down's infants, as reported in the research literature, and those of normal infants. The comparison showed that, in general, infants with Down's Syndrome in the intervention program achieved developmental milestones consistently ahead of Down's infants who had not had the advantage of early intervention and only slightly behind normal infants (Hanson and Schwartz, 1978).

An early intervention program for infants with Down's Syndrome at the University of Washington used a center-based program for mothers and children and was able to report gains similar to those reported by the Oregon project (Hayden and Haring, 1976).

Severely Handicapped Infants

Two programs, one in Tennessee and one in Florida, reported by Bricker and Bricker (1976) and Bricker and Dow (1980), were center-based, with heavy emphasis on parent training. Analysis of child progress revealed that even the most severely handicapped child could make progress. The best predictor of progress was always the pre-test score – the higher the child's score on entry, the greater the gains. Other predictors: earliest possible entry into the program, and length of enrollment (the longer the enrollment, the greater the gains).

Deaf Infants

A program for deaf infants and toddlers in Nashville, reported by Horton (1976), found that children enrolled before age three made significant gains in language and were able to be integrated into regular classrooms by the second grade. Those whose intervention and parent education began later than age three exhibited severe language delay and were placed in self-contained special classrooms in second grade.

An early intervention study in Minnesota (Northcott, 1971) showed a significant reduction in the maladaptive behaviors of deaf children which had previously interfered with their integration into normal classrooms.

SUMMARY INTERVENTION

METHODS AND EFFECTS

- A variety of intervention approaches has successfully altered the way parents used language to motivate their handicapped infants and greatly improved their interaction with their children.
- Early intervention programs, whether home or center-based, group or individual, appear to be successful as long as the parent is acknowledged to be the child's primary educator and is given personalized instruction.
- There is no one magical formula. A number of educational approaches have been found to be equally successful in accelerating the rate of development of infants with all kinds of handicapping conditions.

VI. EFFECTIVENESS OF EARLY INTERVENTION

The collected data on the follow up of children who have been in very early intervention programs show that the children have needed fewer special education services and have achieved at a higher level than would have been predicted by their infant scores. The data show that significant cost savings are realized only when the children have had at least two years in the program.

In 1968, the Congress held hearings that led to the passage of legislation establishing the Handicapped Children's Early Education Program, (HCEEP), some-times called the First Chance Network. The hearings pointed to the need for locally designed ways to serve infants, young children, and their families; for more specific information on effective programs and techniques, and for the distribution of visible, replicable models throughout the country. The drafters of the original legislation made sure that the law addressed the important need to provide major services to handicapped children at a very early age, and to use tested and successful models to assure the delivery of the best possible services (HCEEP Overview, 1983). A number of early intervention programs in Minnesota received their initial funding through the First Chance Network.

In the foregoing chapters, it was shown that the very early interaction between handicapped infants and the people and things in their environment plays a major role in the development of their intelligence and social adaptation. Research described in those chapters showed that very early intervention is developmentally effective for the handicapped child and emotionally rewarding for his parents.

This chapter will be devoted to showing, through HCEEP and other program data, that intervention during the first three years of a handicapped child's life can reduce the need for later special education services.

Measuring Change in Handicapped Infants

The skills of normal infants are well established for each level. They

are often used as a basis of comparison with handicapped children, but such comparisons distort what is really happening to the rate of skill acquisition. For example, a child comes into the intervention program at one year of age with a skill level of six months. At the age of two, his skill level is fifteen months. According to this kind of comparison, before intervention he was six months delayed, now he is nine months delayed. For a normal child, the rate of skill acquisition is one month's growth in one month's time. What is the expected rate for a handicapped child? Obviously, the more severely handicapped the child, the slower the development. Intervention can accelerate skill acquisition beyond the previous rate and sometimes beyond the normal maturation rate as well. In the case of the child in our example, his rate of development for his first year was half of that of a normal child, but in the second year he made nine months progress in one year. Comparison to normal levels of development underestimated the effects of intervention. Using rate of development, averaged either by age or for the period of intervention, reveals the true effects.

With some handicapping conditions, intervention will be deemed a success if the developmental rate does not slow down with age. This may be the case with mildly handicapped or high-risk children. In these cases, intervention becomes prevention.

Norm-Based Comparisons and Severely Handicapped Infants

Many of the children involved in programs of very early intervention are severely handicapped. The degree of their handicaps makes it possible to identify them at a very early age. While early identification makes early intervention possible, there are problems in using standardized, norm-referenced tests to measure their progress. They score so low that the normative data do not include them. This means that only scores of children with mild to moderate handicaps are included in the reports of programs which use norm-based testing instruments.

In order to overcome this problem, many HCEEP model programs used progress measurements based on the child's change in specific behaviors or skills. Change would be reported as a percentage of goals met, or number and/or percentage of skills learned that were appropriate for an early level. Because model programs rarely used the same lists of skills or curricula, achievement, while meaningful, was not comparable. More recently, efficacy reports are using the same curriculum-based assessments which, by now, have established some of the essential test statistics.

Long-term follow up data are usually reported in terms of grade placement and the presence or absence of special education services. This is meaningful for mildly and perhaps moderately handicapped individuals, but not for those who are more severely handicapped. For them, special services will always be needed in spite of the substantial progress they make toward self sufficiency.

Cost Benefit Estimates for Very Early Intervention

Garland, Stone, Swanson and Woodruff (1981) analyzed the costs of intervention programs by using a model of projected costs based on program data and school costs from a number of studies. They have compared preschool programs in which intervention was initiated in the first two years of life with programs in which intervention was started at age six. Their calculations take into account movement from special education to regular education, the timing of which may vary with both severity and type of handicap. The following chart shows the effects of intervention at later ages on the costs of a child's education to age eighteen:

Time of Intervention	Educational Costs to Age 18
Birth	\$37,273
Two years of age	37,600
Six years of age	46,600
Eight years of age	53,340

Progress reports from HCEEP programs show that many children graduating from early intervention projects have been able to enter regular education programs and avoid more costly special education placement. Some children with severe handicaps graduated into programs which would not have been able to accept them had they not had the benefits of early special help. The costs of special education and related services not only increase as the child's entry into an early education program is delayed, but the number of children requiring services increases at each level as intervention is postponed. Delaying intervention means more children requiring more services at higher costs. Early intervention for the same population means that fewer children will require high cost services. Clearly, early intervention is cost effective - developmentally for the child, emotionally for the family, and financially for the family and taxpayers in the community. (Birth - Three Needs Assessment, 1981).

Summary of Effectiveness of Early Intervention*

The earlier an infant and his family receive services to either prevent or remediate a handicapping condition, the greater and longer lasting the benefits. (Smith, 1982). The benefits are many. Handicapped infants and children (and those at risk of developing handicaps) who receive early intervention have shown significant improvement in development and learning, and a decrease in their need for costly special programs, compared with their peers who do not receive early intervention (Lazar, 1979; Moore, Anderson, Frederick, Baldwin and Moore, 1979; Weikart, Bond and McNeil, 1978). Follow-up studies of handicapped and at risk children who receive early intervention have reported that:

*Excerpted from "Affecting State Legislation for Handicapped Preschoolers" Barbara J. Smith, 1983

- eighty percent of the graduates of special education preschool programs were found to be functioning well in less costly regular education classes (Karnes, Shwedel, Lewis, Ratta and Esry, 1981);
- early intervention decreased the likelihood of delinquent behavior in later years (Schweinhart and Weikart, 1981);
- postponing intervention may result in the development of secondary handicapping conditions such as emotional disturbance (Garland, Stone, Swanson, Woodruff, 1981).

Several studies have gone beyond reporting the beneficial effects of early intervention services to infants, children, and their families, comparing these and future benefits with the costs involved in providing the services. For example, Weber, Foster, and Weikart (1978) calculated that the long term benefits of their program outweighed the costs by 236 percent. In 1979 dollars, the percentage increased to 248 percent. The cost of two years of their program was \$5,989 per child, while the economic benefit was \$14,819. The calculations are as follows:

Savings from forward cost of education: \$3,353 per child (average) was saved because fewer children who attended preschool required special education later.

Benefits from increase in projected earnings: \$10,798 increase in lifetime earnings was projected for each child on the basis of educational level, age, race and sex.

Value of mother's time released when child attended preschool:
\$668 per child, based on an average hourly wage for the homemaker in
1979 dollars of \$3.54.

(Schweinhart and Weikart, 1980, p. 36)

Garland et al. (1981) projected that \$10,000 to \$20,000 per child was saved in education costs, depending on the age of earliest intervention. If intervention began at birth, education costs to age 18 were projected to be \$37,272. However, if intervention was delayed to age 6, the cost was projected to be \$53,340. Thus, the cumulative cost of early intervention may in fact be less the earlier the intervention is initiated.

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APPENDICES

Appendix A

MINNESOTA PUBLIC SCHOOL PROGRAMS FOR HANDICAPPED CHILDREN

BIRTH - FOUR

The following is a listing of public schools which reported in their December, 1982, unduplicated child count that they were serving five or more children under the age of four. Districts with small numbers of young children contracted with nearby school districts and DACs or used the early intervention programs of the special education cooperatives.

District NO.	District Name	Number of Handicapped Children	
		0-2 Years Old	3 Years Old
1	Minneapolis	42	18
11	Anoka	4	15
16	Spring Lake Park	3	7
77	Mankato	3	7
88	New Ulm-Hanska	4	8
115	Cass Lake	1	4
129	Montevideo	0	14
181	Brainerd	2	7
200	Hastings	2	4
204	Kasson-Mantorville	3	2
271	Bloomington	1	8
272	Eden Prairie	1	12
279	Osseo	3	7
281	Robbinsdale	3	2
300	LaCrescent	4	2
309	Park Rapids	0	13
316	Coleraine	3	4
318	Grand Rapids	5	14
347	Willmar	3	2

Minnesota Public School Programs for Handicapped Children Birth - Four - continued

District No.	District Name	Number of Handicapped Children	
		0-2 Years Old	3 Years Old
395	Waterville-Ely	1	4
482	Little Falls	7	7
484	Pierz	2	4
492	Austin	9	11
499	LeRoy-Ostrander	0	5
544	Fergus Falls	5	3
621	Mounds View	5	2
625	Saint Paul	110	119
659	Northfield	0	5
695	Chisholm	0	5
701	Hibbing	1	4
709	Duluth	2	20
742	Saint Cloud	19	17
750	Cold Spring	1	4
769	Morris	4	2
790	Eagle Bend	2	3
829	Waseca	6	5
834	Stillwater	8	15
877	Buffalo	7	2
911	Cambridge	10	9
913	Waldorf-Pemberton	2	3

Appendix B

NUMBER OF HANDICAPPED CHILDREN UNDER AGE FOUR SERVED BY MINNESOTA PUBLIC SCHOOLS

1982 AND 1983

Public Law 94-142 Requires school districts to report the number of children from birth to twenty-one being served in special education programs. Some children who are mentally retarded or have cerebral palsy are in some cases served by DACs, under contract to the school district.

Handicapping Condition	1982		1983	
	0-2	3	0-2	3
Speech Handicapped Educable Mentally Retarded	78	380	95	422
	66	65	60	69
Trainable Mentally Retarded	32	30	38	36
Physically Handicapped	88	55	68	53
Hearing Impaired	56	55	59	54
Vision Impaired	26	16	23	12
Learning Disabled	12	42	16	52
Emotionally Disturbed	2	7	2	6
Deaf/Blind	3	0	2	4
Autistic	0	3	0	0
Other Health Impaired	37	4	45	9
	400	657	408	717
<u>Total:</u>	1,057		Total 1,125	

An analysis of the 1982 Child Count shows that 220 school districts served at least one child under age four. Of these 24 served 5 to 10 children, 10 served 11 to 20 children, 4 served 21 to 60 children, and one district enrolled 229 children. Twenty special education cooperatives provided services to 356 children. In addition, several large school districts offered programs for children with low incidence handicaps in their respective geographic areas.

Appendix C

SURVEY OF DEVELOPMENTAL ACHIEVEMENT CENTERS
SERVING CHILDREN AGED 3 YEARS AND UNDER

DECEMBER, 1983

Name of Center	No. of Children In Center-Based Programs	No. of Children In Home-Based Programs
Anoka County DAC	36	40
Becker County DAC	20	20
Blue Earth County DAC	18	27
Carver County DAC	17	13
Cerebral Palsy Center, Mpls	20	0
Chisago County DAC	21	2
Clearwater DAC	3	0
Courage Center Therapeutic Preschool (Henn.)	68	0
Dakota County DLC	150	115
Dodge County DAC	6	2
Douglas County DAC	12	[12]*
East Polk County	0	3
East Range DAC	30	0
Goodhue County DAC	33	8
Itasca County DAC	6	[6]*
Jackson County DAC	0	2
Kandiyohi County DAC	10	0
LeSueur County DAC	7	12
Louis Whitbeck Fraser School (Hennepin)	65	35
Freeborn County Alpha DAC	8	2
Lyon County DAC	7	0
McLeod County DAC	2	0
Meeker County DAC	4	0
Mille Lacs County Area DAC	0	7
Murray County DAC	0	3

* Children also served in center-based programs.

Survey of DACs Serving Children Aged 3 Years and Under, 1983 - continued

	No. of Children In Name of Center Center-Based Programs	No. of Children In Home-Based Programs
Nobles County DAC	0	6
Norman County DAC	2	0
Northeast Learning Center (Ramsey)	24	0
Northland DAC - International Falls	11	0
North Suburban DAC (Ramsey)	30	0
Olmsted County DAC	24	17
Polk. County DAC	13	0
Redwood County DAC	0	7
Renville County DAC	2	3
Reuben Lindh Learning Center - Mpls.	4	32
St. Anthony DAC	24	0
St. Paul's DAC - St. Paul	35	70
Scott County DAC	7	0
Shoreline Early Intervention (Hennepin)	8	8
Sibley County DAC	5	0
Swan Lake DAC - Windom	8	3
Swift County DAC	5	4
Therapeutic Child Dev't Program - St. Paul	36	0
United DAC - Duluth	18	7
Washington County DAC	35	18
Winona County DAC	14	8
Wright County DAC	5	5
	23	479*
Total:		1,402

*Children served only in home-based programs.

Appendix D

HANDICAPPED CHILDREN IN MINNESOTA HEAD START PROGRAMS

1981 - 1982

Agency	No. of 3-Year-Olds
Anoka Community Action Program	2
Arrowhead Economic Opportunity Council	0
Bi-County Community Action	1
Clay-Wilkin Opportunity Council	1
Duluth Head Start Program	4
Goodhue-Rice-Wabasha Council	2
Inter-County Community Action	3
Koochiching-Itasca Action Council	4
Lakes and Pines Community Action Council	0
Region Six Community Action Council	2
Mahube Community Council	0
Wright County Community Action	4
MN Valley Action Council, Inc.	1
Northwest Community Action Council	2
Ottertail-Wadena Community Action	0
Parents in Community Action (Mpls.)	5
Ramsey Action Program	2
Scott-Carver Economic Council	0
SEMAC, Inc.	3
Southwestern MN Opportunity Council	2
Reach-Up Center (St. Cloud)	11
Tri-County Community Action	3
Tri-Valley Preschool Programs	1
West Central MN Community Action	3
Western Community Action, Inc.	2
Prairie Five Community Action, Inc.	1
Parent-Child Center (Hopkins)	Total: <u>1</u>
	60

ESTIMATE OF CHILDREN 0-3 YEARS OF AGE WITH HANDICAPPING
CONDITIONS BY MINNESOTA COUNTY, 1983*

County	Estimated No. Children 0-3 By County	No. Children With Handicapping Conditions	
		Four Percent Estimate	Five Percent Estimate
Aitkin	574	23	29
Anoka	10,372	415	519
Becker	1,547	62	77
Beltrami	1,697	68	85
Benton	1,640	66	82
Big Stone	339	14	17
Blue Earth	2,673	107	134
Brown	1,420	57	71
Carlton	1,425	57	71
Carver	1,873	75	94
Cass	958	38	48
Chippewa	753	30	38
Chisago	1,319	53	66
Clay	2,164	87	108
Clearwater	453	18	23
Cook	176	7	9
Cottonwood	663	27	33
Crow Wing	1,951	78	98
Dakota	9,998	400	500
Dodge	828	33	41
Douglas	1,350	54	68
Faribault	951	38	48
Fillmore	1,025	41	51
Freeborn	1,644	66	82
Goodhue	1,846	74	92
Grant	339	14	17
Hennepin	40,084	1,603	2,004
Houston	891	36	45
Hubbard	684	27	34
Isanti	1,102	44	55
Itasca	2,322	93	116
Jackson	605	24	30
Kanabec	650	26	33
Kandiyohi	1,823	73	91
Kittson	328	13	16
Koochiching	845	34	42
LacQui Parle	467	19	23
Lake	629	25	31
Lake of the Woods	207	8	10
LeSueur	1,157	46	58
Lincoln	384	15	19
Lyon	1,307	52	65
McLeod	1,457	58	73
Mahnomen	308	12	15
Marshall	664	27	33

* Prepared by Services for Children with Handicaps, MN Department of Health

Appendix E - 2

Estimate of Children 0-3 Years of Age with Handicapping Conditions by Minnesota County, 1983

County	Estimated No. Children 0-3 By County	No. Children With Handicapping Conditions	
		Four Percent Estimate	Five Percent Estimate
Martin	1,163	47	58
Meeker	1,006	40	50
Mille Lacs	957	38	48
Morrison	1,618	65	81
Mower	1,765	71	88
Murray	565	23	28
Nicollet	1,371	55	69
Nobles	1,076	43	54
Norman	455	18	23
Olmsted	4,713	189	236
Ottertail	2,259	90	113
Pennington	801	32	40
Pine	1,052	42	53
Pipestone	546	22	27
Polk	1,773	71	89
Pope	559	22	28
Ramsey	21,508	860	1,075
Red Lake	308	12	15
Redwood	945	38	47
Renville	990	40	50
Rice	2,167	87	108
Rock	545	22	27
Roseau	706	28	35
St. Louis	10,130	405	507
Scott	2,288	92	114
Sherburne	1,733	69	87
Sibley	751	30	38
Stearns	5,660	226	283
Steele	1,573	63	79
Stevens	531	21	27
Swift	625	25	31
Todd	1,324	53	66
Traverse	237	9	12
Wabasha	1,026	41	51
Wadena	746	30	37
Waseca	1,032	41	52
Washington	5,577	223	279
Watsonwan	642	26	32
Wilkin	404	16	20
Winona	2,076	83	104
Wright	3,393	136	170
Yellow Medicine	651	26	33
Totals	195,139	7,807	9,758

Appendix F - 2

A Sample Of Developmental Achievement Center Early Intervention Programs - continued

Name of Program: Dakota County Developmental Achievement Center- Project Dakota
750 South Plaza Drive
Mendota Heights, MN 55120 612-454-2732

Contact: James McCaul

Enrollment: Center-based: 150 Home-based: 115 Three sites.

Disabilities: Children functioning at less than 80% of chronological age, or having a diagnosed disorder correlated with a developmental disability.

Programs: Self-help skills, language, motor, socialization. Parent services: support groups, counseling, consultation with community service providers.

Referrals: Public health nurses, public schools, physicians, parents.

Name of Program: Northeast Learning Center Early Intervention Program
2675 E. Highway
36 North St. Paul, MN 55109 612-777-5358

Contact: Marian Dean

Enrollment: 24 children, ages 18 months to four years. Center-based program.

Disabilities: Developmental delays in language, motor, self-help and/or social skills.

Programs: Services given by special education teachers, occupational and physical therapists, speech clinician. Parent services: daily notebook, monthly home visits, parent support groups.

Referrals: Public health nurses, social workers, hospital staffs, physicians, school districts, infant programs, parents.

Appendix F - 3

A Sample Of Developmental Achievement Center Early Intervention Programs -
continued

<u>Name of Program:</u>	Ramsey County Infant Program 1524 Summit Avenue St. Paul, MN 55105	612-698-5175
<u>Contact:</u>	Judy Pappenfus	
<u>Enrollment:</u>	Center-based: 35	Home-based: 70
<u>Disabilities:</u>	Mental retardation, cerebral palsy, developmental delay or at risk to develop problems because of biological or environmental factors.	
<u>Programs:</u>	Infant: weekly home visits. Group and individual parent support. Referral to other agencies. Preschool: 18 months to 4 years. Center-based half-day program. Services: O.T. and P.T., speech and language development, self-help and socialization skills, provided by special education teachers, therapists, family worker.	
<u>Referrals:</u>	Public health nurses, hospital neonatal units, ARCs, county welfare department, physicians, families.	
<u>Name of Program:</u>	St. David's School for Exceptional Children 13000 St. David's Road Minnetonka, MN 55343	612-935-3336
<u>Contact:</u>	Eric Stevens	
<u>Enrollment:</u>	17 infants 0-2 25 toddlers 2-4	
<u>Disabilities:</u>	Down's Syndrome, cerebral palsy, seizure disorders, functional mental retardation.	
<u>Programs:</u>	Infant: Weekly parent-child session in center. Home program of 1 ½ hours with O.T., P.T., infant teacher. Parent support group. Preschool: 3 hours per day, 5 days per week. Mainstreaming in regular nursery school. Staff to child ratio -1:3 or 4. O.T. and speech therapy. Diagnostic program: Developmental assessment, O.T., P.T., speech and language, psychological consultation.	
<u>Referrals:</u>	Pediatricians, public health nurses, social workers.	

Appendix G

A SAMPLE OF PUBLIC SCHOOL EARLY INTERVENTION PROGRAMS IN MINNESOTA

<u>Name of Program:</u>	Austin Public Schools Early Education Program 202 - 4th Avenue N. E. Austin, MN 55912 507-433-0456
<u>Contact:</u>	Cathy Cathcart
<u>Director:</u>	Dr. Malcolm McDonald
<u>Enrollment:</u>	Home-based: 7 Center-based: 10
<u>Disabilities:</u>	Mentally retarded, physically handicapped, emotional/behavior disorders, speech and language delay.
<u>Staff:</u>	Teachers, O.T., P.T., aides, speech clinician, psychologist, social worker, music therapist. Staff also used for four-and five-year-olds.
<u>Coordination with Other Agencies:</u>	Mower County Social Services, Gerard In Home, physicians, day care center.
<u>Referrals:</u>	Public health nurses, physicians, social workers, parents.
<u>Name of Program:</u>	Brainerd Public Schools, Paul Bunyan Cooperative Brainerd Administrative Office Brainerd, MN 56401 218-828-2361
<u>Contact:</u>	Denny Martin
<u>Director:</u>	Norm Andresen
<u>Enrollment:</u>	Home-based: 3 Center-based: 17 Ages: birth - four.
<u>Disabilities:</u>	Mentally retarded, hearing impaired, multiply handicapped, developmentally delayed.
<u>Program:</u>	Speech and language development, occupational therapy, self-help and pre-academic skills, socialization. Parent support.
<u>Districts in Cooperative:</u>	Aitkin, McGregor, Backus, Pillager, Pine River, Brainerd, Crosby/Ironton, Pequot Lakes.
<u>Referrals:</u>	Public health nurses, physicians, social workers, parents.

A Sample Of Public School Early Intervention Programs In Minnesota

<u>Name of Program:</u>	Freshwater Special Education Cooperative Early Education Program North Fifth Street Staples, MN 56479 218-894-2438
<u>Contact:</u>	Mary Jo Hofer
<u>Director:</u>	Earl Mergens
<u>Enrollment:</u>	10 Center-based 6 Home-based Ages: 0-4
<u>Disabilities:</u>	Mental retardation, hearing impairment, visual handicaps, physical impairments, speech disorders, speech and language delays.
<u>Programs:</u>	Speech and language development, self-help skills, balance, positioning, adaptive physical education, socialization.
<u>Staff:</u>	Teachers, O.T., P.T., aides, speech clinician, adaptive physical education teacher.
<u>Coordination:</u>	Todd County Social Services, Todd County Department of Health, Paul Bunyan Special Education Cooperative, Mid-State Special Education Cooperative.
<u>Districts in Cooperative:</u>	Motley, Browerville, Clarissa, Eagle Bend, Staples.
<u>Referrals:</u>	Public health nurses, physicians, social workers, parents.

<u>Name of Program:</u>	Mid-State Educational Cooperative Early Education Program 100 - 11th Street S. E. Little Falls, MN 56345 612-632-2921
<u>Contact:</u>	Toni Schoepf
<u>Director:</u>	John T. Russell
<u>Enrollment:</u>	11 Center-based 11 Home-based 11 in both 33 total, ages 0 - 4. 7 sites (also serve 4 and 5-year-olds.)
<u>Disabilities:</u>	Developmentally delayed, hearing impaired.
<u>Programs:</u>	Infant stimulation, speech and language development, O.T., P.T., self-help skills, socialization, listening skills.
<u>Staff:</u>	Teachers, aides, O.T., P.T., speech clinician.
<u>Coordination:</u>	Contract with Morrison County Social Services.
<u>Districts in Cooperative:</u>	Little Falls, Pierz, Royalton, Swanville, Upsala.
<u>Referrals:</u>	Public health nurses, social services, Head Start, hospital.

Appendix G - 3

A Sample Of Public School Early Intervention Programs In Minnesota

Name of Program: River Bend Special Education Cooperative Early Education Program

412 N. Minnesota Street

New Ulm, MN 56073

507-359-7057

Contact: Tyler Tescher

Director: Dennis Thorsen

Enrollment: 30 children 0-3 in 5 sites

Disabilities: Mentally retarded, multiply handicapped, cerebral palsy, deaf-blind, Down's Syndrome, Sturge-Weber's Syndrome.

Programs: Speech and language, self-help skills, socialization, positioning, motor activities, parent support groups.

Staff: Teachers, speech clinicians, O.T., psychologist.

Districts in Cooperative: Sleepy Eye, New Ulm, Arlington, Gaylord, Gibbon, Henderson, Winthrop.

Referrals: Public health nurses, physicians, school districts, parents, social workers.

Name of Program: St. Paul Schools Regional Program for Low Incidence Infants

Como Park Elementary School

780 W. Wheelock Parkway

St. Paul, MN 55117

612-489-8035

Contact: Karen Leverentz

Director: Charles M. Hagen

Enrollment:

Hearing impaired -	0-2: 13	3-4: 15	
Vision impaired -	0-2: 11	3-4: 17	
Phys. impaired -	0-2: 28	3-4: 54	Total: 144
Deaf-blind -	0-2: 2	3-4: 4	

Staff: Teachers of deaf, deaf-blind, visually handicapped, physically impaired, O.T.s, P.T.s, speech clinicians, nurses, adaptive physical education teacher, social worker, parent worker.

Districts: 21 districts in East Metropolitan Special Education Council.

Referrals: Public health nurses, social workers, physicians, hospitals, school districts, DACs, parents.

Note: All programs described above also serve four - and five-year old children with handicapping conditions or serious developmental delays.